



THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Advanced Biomedical Micro/Nanotechnologies

BIOMEDE 5610

Credit Hours:

3.00

Course Levels:

Undergraduate (1000-5000 level)

Graduate (5000-8000 level)

Course Components:

Lecture

Course Description:

Examinations of micro- and nano- technologies for biomedical applications, including review of micro/nanofabrication and biophysical chemistry. Critiques of the Micro-Electro-Mechanical-Systems (MEMS) and nanotechnology as tools for detecting signals or performing functions for biomedical research and clinical purposes. Discussion and analysis of current research.

Prerequisites and Co-requisites:

Prereq: 4610 or equiv, or Grad standing, or permission of instructor.

Course Goals / Objectives:

- Students will appreciate for the broadness and complexity of biomedical micro/nanotechnologies.
 - Students will understand the technologies that enable and support micro/nanodevices for biomedical applications.
 - Students will understand the technologies that enable and support micro/nanofluidics for biomedical applications.
 - Identify the key advantages and limitations of biomedical micro-/nano- technologies. (ABET SLO 7)
 - Select appropriate biomedical micro/nanotechnologies for given real-world needs. (ABET SLO 7)
 - Design fabrication protocols for creating key micro/nanostructures in selected biomedical sensors. (ABET SLO 2)
 - Quantify the performance of micro/nanoparticles in drug and gene delivery applications. (ABET SLO 1)
 - Justify the design of micro/nanofluidic devices for basic research and clinical applications. (ABET SLO 6)
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Course Topics:

- Fundamentals of Micro/Nanotechnologies (technical history, miniaturization and scaling law)
 - Materials and Manufacturing (semiconductors and functional materials, biomaterials, micro/nanomanufacturing, new manufacturing approaches)
 - Biomedical Sensors/Actuators (mechanical sensors, nano materials and super-resolution imaging, electrical/chemical sensors, actuators and motor molecules)
 - Micro/Nanofluidics (basics of fluid mechanics, fluids in electrical and acoustic fields, mice/nanoparticales for drug/gene delivery)
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Designation:

Elective